

Questioning Strategies for Science Conceptual Understanding

N A R R O W Q U E S T I O N S

Type of Question	Description	How Do I Ask This Type of Question?	When Do I Use This Type of Question?	Examples	What Thought Processes Do Students Use to Answer This Type of Question?
M E M O R Y	Memory level questions involve answers typically found in sources such as books, web sites, and other reference materials, or brought to mind from previous or "at hand" experiences. <u>Predictable short answer student responses are anticipated and expected.</u>	Who... What... Where... When... Describe... How much ... How many ...	Used to: <ul style="list-style-type: none"> Assess/Reinforce prior learning Set the stage (focus attention, build information base) Summarize key points 	<ul style="list-style-type: none"> Who developed the planetary model of the atom? What did you observe when you added vinegar to baking soda? What color change did you observe when you used iodine to test for starch? How many scoops of salt were needed to create a saturated solution? 	Useful if you want students to: <ul style="list-style-type: none"> Recall facts Recognize information Define a term Identify something Respond from rote memory Focus attention Count and measure
C O N V E R G E N T	Convergent thinking questions require the organization of facts and ideas, the ability to analyze and put them together, and explain their integration. Students compare, combine, and synthesize information in a direction planned by the teacher. <u>A limited set of specific, predictable student responses is expected.</u>	Why... How... In what ways... What would happen if... How would you show me... What would you do to test... Compare... Contrast... Explain...	Used to: <ul style="list-style-type: none"> Guide student toward an idea, but student develops the idea on his/her own terms Extend a student's ideas Probe and clarify a student's response 	<ul style="list-style-type: none"> How does mass differ from weight? How are seasons caused? How does an igneous rock compare to a sedimentary rock? Diagram the transfer of energy from a battery to a bulb. How do the parts of the digestive system work together to break down food? 	Useful if you want students to: <ul style="list-style-type: none"> Comprehend Explain Transfer Compare and contrast State relationships Analyze Interpret Apply facts, rules, principles Synthesize information to arrive at particular conclusions

B R O A D Q U E S T I O N S

Type of Question	Description	How Do I Ask This Type of Question?	When Do I Use This Type of Question?	Examples	What Thought Processes Do Students Use to Answer This Type of Question?
D I V E R G E N T	Divergent thinking questions are open-ended and focus on material that is largely cognitive. Questions can be classified as divergent only if the teacher is not seeking a specific, planned response. <u>Set of possible student responses is not limited or predictable.</u>	Imagine... Suppose... If..., then... How might... Can you create... What are some possible consequences... Predict....	Used to: <ul style="list-style-type: none"> Assess/Reinforce prior learning Set the stage (focus attention, build information base) Summarize key points 	<ul style="list-style-type: none"> How would you design an experiment to test...? How did you solve that problem? What is your evidence? What might be another explanation for...? What could be done to...? What other factors might be involved...? What would you predict/infer from...? How would you create/design a new...? What solution would you suggest for...? How might life in the year 2100 differ from today? 	Useful if you want students to: <ul style="list-style-type: none"> Predict Hypothesize Infer Reconstruct Reason Problem solve Synthesize ideas to form an original idea or solution
E V A L U A T I V E	Evaluative thinking questions are characterized by their judgmental quality. Students synthesize information and arrive at a personal preference, opinion, or judgment. <u>Responses reflect students' personal opinions, preferences, or judgments (as derived from evidence).</u>	Defend How would you judge... Justify... What do you think about... What is your opinion about... Evaluate...	Used to: <ul style="list-style-type: none"> Establish an atmosphere in which students recognize that individual opinions are valued Encourage debates, surveys, role plays 	<ul style="list-style-type: none"> What do you think about...? What makes you like the...? Why do you say...? What is your opinion...? What is the most important...? How would you decide about...? What criteria would you use to assess/evaluate...? 	Useful if you want students to: <ul style="list-style-type: none"> Evaluate Come to a conclusion Judge